

Appl. No. 10/518,267; Docket No. NL 020591
Amdt. dated October 5, 2006
Response to Office Action dated August 14, 2006

Amendments to the Claims

1. (*Currently Amended*) A semiconductor device with an edge termination structure, comprising:

 a semiconductor body (~~1, 3~~) having opposed first (~~5~~) and second (~~7~~) surfaces and an edge termination region (~~15~~) at the periphery of the semiconductor body;

 a plurality of edge termination trenches (~~17~~) extending across the edge termination region of the semiconductor body (~~1, 3~~) and vertically from the first surface (~~5~~) towards the second surface (~~7~~) of the semiconductor body through a region of a first conductivity type;

 conductive material (~~20, 60~~) extending vertically at the edge termination trenches for depleting the region of a first conductivity type between adjacent trenches;

 insulating material (~~19, 62~~) extending vertically at the edge termination trenches;

 surface implants (~~21~~) of second conductivity type opposite to the first conductivity type extending parallel to and along both sides of the edge termination trenches (~~17~~) adjacent to the first surface; and

 an electrically conductive path (~~23, 41, 43~~) associated with each edge termination trench (~~17~~) forming an electrical connection between the surface implants (~~21~~) on both sides of the edge termination trench (~~17~~).

2. (*Currently Amended*) A semiconductor device according to claim 1 wherein the conductive material (~~20~~) extending vertically at the trenches is semiconductor material of the second conductivity type.

3. (*Currently Amended*) A semiconductor device according to claim 1 or 2 wherein the electrically conductive path (~~23, 41, 43~~) is formed by a conductive layer (~~41~~) filling at least the portion of the edge termination trenches adjacent to the first surface.

4. (*Currently Amended*) A semiconductor device according to claim 1 or 2 wherein the electrically conductive path (~~23, 41, 43~~) is formed by a conductive layer (~~23, 43~~)

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extending over the first surface transversely across the edge termination trenches between the surface implants on both sides of the edge termination trenches.

5. (*Currently Amended*) A semiconductor device ~~according to any preceding claim~~
according to claim 1, wherein

the edge termination trenches (17) have sidewalls (18);

the conductive material (20) is a conductive layer along the sidewalls (18) of the edge termination trenches extending downwards from the surface implants on both sides of the trench; and

the insulating material (19, 62) fills the trenches between the conductive layers on the sides of the trench.

6. (*Currently Amended*) A semiconductor device ~~according to any of claims 1 to 4~~
according to claim 1, wherein the edge termination trenches have sidewalls (18);

the insulating material (19, 62) is an insulating layer extending downwards on the sidewalls (18) of the edge termination trenches;

the conductive material (20, 60) fills the trench between the insulating material on the sidewalls.

7. (*Currently Amended*) A semiconductor device ~~according to any preceding claim~~
according to claim 1, wherein the electrically conductive path (23) is of doped polysilicon.

8. (*Currently Amended*) A semiconductor device ~~according to any preceding claim~~
according to claim 1, wherein:

the semiconductor body has a central active device region (11) and a periphery (13);

the edge termination region (15) surrounds the central region of the semiconductor device within the periphery (13); and

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the plurality of trenches ~~(17)~~ have different depths, the trenches ~~(17)~~ adjacent to the central region ~~(11)~~ of the semiconductor device being deeper than the trenches ~~(17)~~ adjacent to the periphery.

9. *(Currently Amended)* A semiconductor device according to any preceding claim, according to claim 1, wherein the semiconductor device has an active device region ~~(11)~~ including a plurality of active region trenches ~~(70)~~ extending laterally across the active device region and vertically from the first surface towards the second surface.

10. *(Currently Amended)* A method of manufacture of a semiconductor device, including providing a semiconductor body, having opposed first ~~(5)~~ and second ~~(7)~~ surfaces and a semiconductor region ~~(1,3)~~ of first conductivity type adjacent to the first surface;

forming trenches ~~(17, 70)~~ extending laterally across the semiconductor body and vertically from the first surface towards the second surface;

forming vertically extending conductive material ~~(20, 60)~~ and insulating material ~~(10, 62)~~ at each of the trenches;

forming conducting semiconductor regions ~~(21)~~ of second conductivity type opposite to the first conductivity type along both sides of the trenches ~~(17)~~ in an edge termination region ~~(15)~~; and

depositing conductive material on the first surface at the trenches to form a conductive path between the conducting semiconductor regions on both sides of the trenches.